## REMARKS

Summary of Office Action

Claims 13-17 and 30-36 are pending.

Claims 13-17 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In particular, with reference to claim 13, the Examiner states that the recitation "a pair" of conductive elements is new matter. Claims 13-7 also have been rejected under 35 U.S.C. § 112, second paragraph, as vague and indefinite.

Further, claims 13, 16, 17, 30-33 and 36 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Braun et al. International Publication No. WO 99/04440 ("Braun").

The Examiner finds patentable subject matter in claims 34 and 35, and states that these claims would be allowed if rewritten in suitable independent form.

Statement Of Substance Of Interview

Applicants thank the Examiner for the courtesies extended to the undersigned during the telephone interview on October 19, 2005.

The undersigned and the Examiner discussed the Proposed Reply(including claim amendments) faxed to the Examiner on October 19, 2005. The Examiner indicated that the proposed claim amendments would overcome the § 112 rejections.

However, no agreement was reached on the § 102 rejection. The undersigned noted that the cited reference Braun did not show use of "DNA material" active core for transistor action. The Examiner was of the opinion that the claim language did not exclude the structures of Braun, which the undersigned respectfully disagreed with. The undersigned understood that the Examiner would review structures of Braun in further detail after a formal reply was submitted.

Summary of Applicants' Reply.

Applicants appreciate the Examiner's finding of allowable subject matter in claims 34 and 35. Applicants respectfully traverse the § 112 rejections and the prior art rejections.

Claims 13 and 30 have been amended. No new matter is added.

§ 112 rejections

As indicated by the Examiner during the interview, the proposed claim amendments overcome the § 112 rejections. Applicants note that the "wherein clause" in the proposed claim 13 discussed at the interview has been further amended by replacing "said active core" by "said fourth DNA segment."

Applicants submit that the claims conform to all § 112 requirements. However, if the Examiner finds any deficiencies, applicants request that the Examiner should kindly contact the undersigned by telephone for quick resolution.

§ 102 rejection.

Applicants resubmit Remarks overcoming the § 102 rejection that were presented in the Proposed Reply. (See Appendix A).

Further, applicants again note that claimed inventive transistors use "DNA material" as the active core material. (See e.g., FIG. 2 active core 205; and FIG. 3A, strand "TTTTAAAAATTTT", FIG. 3B active core 324, etc.). Claim 13 explicitly calls the active core material as the "fourth segment of DNA." Claim 30 explicitly calls the active core as "the length of the DNA molecule." In each case, a gate structure is disposed adjacent to the DNA active core. Transistor action, i.e. control of electric current/charge in the active DNA core is obtained by application of a voltage to the gate structure.

Applicants again note that Braun does not show, teach or suggest using a length of a DNA molecule as the "active core" of a transistor (claim 13) or a gated electronic device (claim 30). Braun only describes using DNA molecules, chains or fibers to form a template or support structure to shape other electronic materials making a micro-electronic device.

With reference to Braun's FIG. 6, applicants again note that "active core" 600 is a copper particle. Three oligonucleotides 601, 604, and 606 are bound to particle 600, which is first coated with an insulating barrier. Oligonucleotides 601, 604, and 606 (which act as links) are extended to fibers 612, 614, and 616 to form integral fibers 622, 624 and 626. These act as lithographic templates or molding forms that are then coated with metal to convert them into metal wires 622, 624 and 626. One of the three metal wires (e.g., wire 622) that is designated to serve as a gate conductor is placed in a high resistance contact 608 (using a protein) with particle 600. (See e.g., Braun, page 30 line 9 - page 31 line 9).

Clearly, Braun does not show, teach or suggest an "active DNA core" transistor or the means of making electrically useful source, drain and gate contacts (i.e. P-bridges and H-bonds) to such an active DNA core.

For at least the foregoing reasons, claims 13 and 30 are patentable over Braun. Further, dependent claims 14-17, 31-33, and 36 are patentable for at least the same reasons.

Conclusion

This application is now in condition for allowance. Reconsideration and prompt allowance of which are requested. If there are any remaining issues to be resolved, applicants respectfully request the Examiner to kindly contact the undersigned attorney by telephone for an interview.

Respectfully submitted,

Manu J Tejwani
PTO Reg. No. 37,952
(212) 408-2614

Attorney for Applicant

BAKER BOTTS L.L.P.
30 Rockefeller Plaza
New York, NY 10112

## Appendix A

For completeness, applicants' reproduce here the Remarks addressing the § 102 rejections that were presented in the Proposed Reply:

> § 102 rejection.
>
> Claims 13, 16, 17, 30-33 and 36 have been rejected as anticipated by Braun. Applicants respectfully traverse.
>
> Independent claims 13 and 30
>
> Applicants note that transistor action in a conventional semiconductor transistor (e.g., silicon field effect transistor) is obtained by activating, switching or modulating the electronic properties of the silicon material "active" core. A gate voltage, which is applied to the silicon material active core, changes the active core's conductivity and leads to "transistor" action i.e. increase or decrease in the current flowing through the active core between source and drain terminals.
>
> Applicants' invention uses a length of DNA material as the "active" material or core of a transistor instead of conventional semiconductor materials. For example, claim 13 recites, "wherein the active core comprises a fourth DNA segment." Transistor functionality is obtained by activating, switching or modulating the electronic properties of the length of DNA material itself. (See e.g., specification page 7). Claim 13, for example, includes the recitation that the "third segment is configured to electrically modulate current flowing across said [DNA material] active core." Claim 30 similarly recites, "electric charge in the length of the DNA molecule can be controlled by application of a voltage or current to the [capactively coupled] gate structure."
>
> As previously submitted, Braun does not show, teach or suggest using a length of a DNA molecule as the "active core" of a transistor (claim 13) or a gated electronic device (claim 30).
>
> Braun only describes using DNA molecules, chains or fibers to form a template or support structure to shape other electronic materials making a micro-electronic device. (See Braun, Summary of Invention , page 3). Braun's DNA

material, which is used as scaffolding, is removed after device formation. (See e.g., Braun page 18 lines 10-15). Braun does not show, teach or suggest use of the DNA material itself as the "active" electronic device material.

The Examiner cites Braun (i.e., Fig 6, page 30 line 9 - page 31 line 5, page 16 lines 4-10, and page 5 lines 5-9) as somehow disclosing "an active DNA core" transistor. (See Office Action, pages 3 and 4). Applicants respectfully disagree. The cited portions of Braun only describe use of nucleotide chains or fibers as a lithographically template or mold to make electronic device networks, but do not describe or suggest any use of electronically active DNA material in a transistor or device. The "active portions" in Braun's electronic networks are all made of non-DNA material. (See e.g., page 16 lines 11-21: "non-nucleic acid fiber (e.g., conducting polymer or being a carbon nano-tube)," and page 16 lines 23-25: "conducting or semi-conducting polymer or co-polymer or conducting nano-tube"). Applicants also note that cited portion of Braun at page 30 line 9 - page 31 line 5, which relates to Fig. 6, describes a "colloid" particle 600 as forming "the active core" of a single electron transistor (SET). In Braun's construction of the SET, three oligonucleotides 601, 604, and 606 are attached to particle 600, which is first coated with an insulating barrier. Oligonucleotides 601, 604, and 606 act as lithographic templates or molding forms that are then coated with metal to convert them into metal wires 622, 624 and 626. Applicants note in particular that Braun's colloidal particle 600 is a gold particle that is covered with an alkaline thiol insulating gate layer (analogous to a silicon dioxide gate layer in s conventional silicon-based transistor). (See e.g., Braun, Fig. 6, and Example 14 pages 51 - 52). One of the three metal wires (e.g., wire 622) that is designated to serve as a gate conductor is placed in a high resistance conatact 608 with particle 600. Braun's SET exploits conventional coulomb blockage effect at the high resistance contact 608 to obtain transistor action in the gold particle 600. (See e.g., Braun page 31 lines 2-9, and the background description of the coulomb blockage effect in applicants' specification at page 8 lines 4-11).

Clearly, Braun does not show, teach or suggest an "active DNA core" transistor or the means of making electrically useful source, drain and gate contacts (i.e. P-bridges and H-bonds) to such an active DNA core.

For at least the foregoing reasons, claims 13 and 30 are patentable over Braun. Further, dependent claims 14-17, 31-33, and 36 are patentable for at least the same reasons.